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1992- Another Unusual Crop Season

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Introduction

According to the October Crop Report the 1992 Iowa corn and soybean yields are estimated at 135 and 42 bu/ac, respectively. These numbers may change somewhat in the November and January crop reports; however, there is little question that the crop is a big one. The main concern as of mid-October was getting corn dry enough so that harvest can proceed. As the crop matured 10 to 20 days late, it is not surprising that wet grain would be a problem. Ear and stalk rots and grain physical quality problems could also be concerns.

With the small acreage set-aside (5%) Iowa farmers are expected to harvest 13.1 million acres of corn, 8.1 million acres of soybeans. At present yields this would be the largest corn crop in terms of total bushels produced in the state's history. With all the "headline producing" problems during the year why are yields so high? The answer is water at key crop stages. A very dry June in some areas and the extremely cool July and August came close to being major problems. However, except for fields that were replanted for various reasons (hail, dry soils, etc.) or the areas flooded in September, crops are decent in nearly all regions of the state.

Early Season Conditions

Most areas of Iowa had a full tank of subsoil moisture going into the planting season. April was cool and slightly wet -- thus, only 3% of the corn crop was planted prior to April 26. Most of that was planted in the April 13-15 period. Snow in western Iowa and big rains in the south followed these plantings, some of which had to be replanted -- mostly due to cool soils and soil crusting and not the snow. Fortunately, warm and dry weather permitted corn planting to start in a big way on the last few days of April. According to the Iowa Agricultural Statistics Report 86% of the corn was planted by May 10 and 97% by May 17. By May 17 63% of the soybean crop was planted and planting was essentially complete (97%) by May 31. These numbers are extremely important in view of the very cool July and August weather that delayed crop maturity. Contrast 1991 and 1992 corn and soybean planting dates in the north central Iowa Crop Reporting District. The 50% planted dates for both crops were almost exactly a month later in 1991. If this planting delay would have occurred in 1992, the crop in that area would have been a complete disaster.

May was dry and warm (Tables 1 and 2). The 3-week period from April 27 to May 17 was very warm; thus, corn not planted during the early part of this period missed about the only

warmer than normal period during the entire season. Although "traffic marks" were visible in fields worked during the early part of this period, one can't argue with the decisions based on how the year developed. Lack of May rain permitted rapid planting, but also contributed to uneven crop emergence. The net result was uneven crops in many cases and less than optimum plant stands in some fields. As dry topsoils persisted into June, some fields that would normally be replanted were not, as moisture was inadequate to germinate the seed. This was not the year to plant shallow for the reason just discussed. In many cases increasing seed depth by only one-quarter or one-half inch resulted in more even plant stands. Fields that had surface soils dried out by excessive spring tillage had the greatest problem. No-till worked well assuming planting depth was adequate. There is some danger that crop producers will now over-compensate with "too deep" planting -- especially if a spring is cold and wet.

Planting depth was one of the factors contributing to the dry weather induced potassium (K) deficiency that was so visible in many cornfields in June. This periodic problem, especially with ridge till plantings, develops when the soils around the nodal root system stay dry for an extended period following plant emergence. Planting deeper may not "cure" the problem, but the problem is often worse if seed depths are less than 2 inches. Frost on May 27 did some damage to crops mainly in eastern Iowa and into Illinois. Some spotty damage was observed in other parts of Iowa. The same weather system did serious damage in South Dakota, Nebraska and in parts of Kansas and Colorado.

June, July and August

June was dry, especially in the southeast one-half of the state. The corn crop was "on the edge" in some areas before the "rainy season" began on July 2. July was very wet and cool with the greatest precipitation amounts falling on those areas (EC, SE, SC, C) needing it most. Corn was only 2 to 4 weeks away from silking, but went through an incredible vegetative growth sprint. Even after tasselling there was a height increase, something very unusual. A frost on June 20 hurt crops in low areas -- mainly in the northeastern part of the state and in peat soils. Damage was more severe in states north and east of Iowa.

With the wet and cool July weather moisture stress at silking was a non-issue. The average silking date was about July 25 which was 2 to 4 days behind normal. Silking was several days behind some recent years. About 15% of the crop silked in early August. These were the fields most susceptible to the freeze on September 29.

In late July and early August yellow soybeans were not uncommon due to wet soils. By late August N deficiency symptoms were fairly common in cornfields -- often in what were either tillage or N application patterns. After the first week or so August was below normal in precipitation in most of the state. August was very cool with growing degree accumulations falling farther behind. Negative GDU numbers by month's end ranged from about 200 in the southeast to near 400 in northwest Iowa.

September-October

September precipitation ranged from slightly below normal in northwest Iowa to severe flooding in south-central Iowa. For example, rainfall averages for the month ranged from 1.5 inches in Emmet County to 16.9 inches in Wayne County. In spite of all the extremes the rainfall for the May-September period was close to normal in much of the state.

Temperatures for September were very close to normal (-19 to +16 GDU range) in all Crop Reporting Districts. Frost on the mornings of September 28 (NW) and over most of the north half of the state on September 29 killed most corn and soybean leaves. The amount of injury was more hit and miss in southern Iowa. Stalks and ear shoots on most corn survived for a few more days and likely allowed some increase in grain yields due to carbohydrate translocation in fields not quite mature. Thus, yield losses were very slight in fields that were just a few days from maturity. Fields needing ten days to two weeks to mature (milk line not halfway down) lost some yield (perhaps up to 5%) versus what an October 10 to 14 freeze would have inflicted.

Yield is only part of the story. A major issue of a late maturity crop is grain dry down following maturity. The rate of dry down is very weather dependent (i.e., what kind of drying weather one gets). A late maturing crop means grain will be in its dry down phase in mid- to late October versus late September to early October when the crop matures on time. This is a period of rapid change in temperatures, day length and other factors that relate to the speed crops dry in the field. This greatly increased the likelihood that the 1992 corn crop would be combined at a much higher moisture content than in recent years. Drying expenses increase and grain quality of such a crop can be an issue. The problem is not so much one of the frost as it is of getting decent drying weather after maturity (grain typically is in 32 to 36% moisture range at maturity). Fields that were at 40% or more when frosted will need a very long drying period to dry to combine moisture (24 to 26%) and in some falls will struggle to get that low.

Additional Discussion of Crop Maturity

Note the GDUs from May 1 through September 27 as listed in Table 2. Plants not frozen (September 28-29) accumulated a few more GDUs than the table indicates -- especially in parts of southern Iowa. However, hybrids rated from 2,500 to over 2,700 GDUs were from 200 to over 400 GDUs short at the time of freeze in the northern one-third of the state. If one accepts the idea that 20 GDUs equals one day, these hybrids would have been from 10 to 20 of these "20 GDU" days short for the season. Although immature in many cases, most were not as far behind as a strict GDU interpretation would have indicated. This would especially be true for the silking to black layer (mature) period. In 1992 this period was longer than the standard 56 day span, which is average, but not as long as GDUs would indicate. The author's observations were that if one split the time difference between the standard 56 day concept and the time span suggested by GDU accumulations, it was close to what happened. Clearly, day length or some other factor comes into play during the reproductive period.

This was more obvious for soybeans. Although behind a warmer season, plants were triggered toward maturity sooner than one would expect based on GDU accumulations in early to mid-September. Soybeans are known to be more day-length sensitive than corn; however, the author has wondered for some time whether very cool nights don't induce this plant toward maturity. Brown stem rot also speeded up some fields. Considerable soybean pod filling occurred in late August and into early September in 1992. Some may have underestimated the potential of the 1992 crop based on poor pod fill in early to mid-August.

Abnormal Corn Ears

Two different ear development problems existed in some fields. The exact reason "why" each occurs in not well understood but observations give us some clues.

Silk balling has been a problem to a varying degree in past years. One hears of an occasional case about every year, but I believe 1984 was the last year when the problem was general. In many fields it influenced only an occasional ear. In other cases there will be a substantial yield reduction.

Kernel development on the butt end of the ear is fairly normal. Pollination on roughly the tip half of the ear is poor. This results from silks from that part of the ear not emerging. These silks, which develop slightly later, are unable to emerge and curl up in a ball-like structure; thus, the term "silk balling".

When and why does this happen? It seems to be a problem in years when rainfall at the time of silking is very plentiful and there may be a cool temperature association. Perhaps it is as simple as excess husk growth over the ear tip area restricting silk growth. Some feel cool temperatures restrict silk growth.

In a given field it is not unusual to see more of the problem in one hybrid than in another. However, as one looks at other fields, this relationship may not hold up. More important than anything appears to be the timing of silking and weather events. Like many physiological problems, silk balling is difficult to study because it appears very sporadically. The majority of my calls on this issue in 1992 came from the northern half of the state.

The second problem involved very short ears. Prior to 1992, I had seen this in only a small number of fields. This year the majority of the calls came from east central, southeast, south-central and part of southwest Iowa. Parts of Missouri, Illinois and Indiana also had the problem. It also was even reported in popcorn. It has been reported in Colorado in prior years.

A typical ear may be only 2 or 3 inches long. The butt end looks like a normal ear, but there is little cob extension beyond that. Unlike for silk balling or other typical non-pollinated ears, there is little barren cob or "tip-half" of the ear. In some cases there were almost no

kernels. The husk and ear shank are fully developed. The number of such ears and their distribution within problem fields varied greatly.

In Iowa the problem was greatest in areas that were very dry in June followed by above normal rain in July. This corn was under moisture stress during the mid-vegetative stages, then received considerable rain. It is impossible to know exactly what happened, but I feel the problem is related to the sudden surge in vegetative growth of corn that had been under stress. The corn was in the process of establishing the potential number of kernels per row when it was under stress, but once the rains came, vegetative growth was favored and further ear shoot growth was inhibited.

There appears to be no specific management practice that is consistently associated with the problem other than some type of "stress". Some feel it may be related to disease, but many fields had no disease symptoms. There is no consistent herbicide history in these fields. Some fields had the problem along field edges, others do not. Some people have wondered about a possible pH influence? In some cases the problem is greater in one hybrid than in another. But again, this isn't very consistent. N deficient fields, especially in dry areas, tended to have the problem. There remains much to be learned about this problem. For whatever reason it was far more common in 1992 than in prior years.

Summary

Each crop season is unique and 1992 certainly had its special characteristics. A dry June, a very wet July, very cool July and August, etc., were those items that stood out in 1992. Delay corn and soybean planting dates by two or three weeks, or get a killing frost two or three weeks earlier, and the results would have been very different. If any one of these events would have happened, the Iowa economy would be several million dollars poorer.

What will the 1993 crop season be like? I suspect several climatologists will be talking about dry weather for 1993. Prepare for management questions under a dry weather scenario.

Table 1. 1992 Iowa Regional Precipitation Departure from Average in Inches (Above normal except where designated as minus)*

District	May	June	July	August	September	Total
NW	-0.7	-1.0	4.0	0.6	-0.6	2.3
NC	-1.4	-1.6	2.2	-1.4	0.5	-1.8
NE	-2.5	-2.5	2.1	-1.5	2.0	-0.9
WC	-1.7	-2.2	3.8	-1.0	1.8	0.7
C	-2.7	-3.3	6.3	-2.0	0.4	-1.3
EC	-3.4	-3.3	6.5	-1.7	2.7	0.8
SW	-2.3	-2.5	4.4	-3.1	4.1	1.1
SC	-2.6	-3.2	5.4	-2.3	6.9	4.2
SE	-2.8	-3.2	6.3	-2.1	2.9	1.1

*Adapted from Iowa Agricultural Statistics Reports.

Table 2. Growing Degree Units from May 1 to Date Indicated.*

District	May 31	June 28	August 2	August 30	September 27
NW	391	878	1,460	1,911	2,284
NC	383	878	1,465	1,897	2,267
NE	391	866	1,473	1,907	2,270
WC	405	922	1,576	2,059	2,464
C	408	935	1,604	2,073	2,467
EC	412	938	1,619	2,090	2,482
SW	417	960	1,699	2,217	2,649
SC	419	966	1,720	2,234	2,656
SE	446	1,021	1,791	2,318	2,752

*Adapted from Iowa Agricultural Statistics Reports.

Table 3. Growing Degree Units from May 1 to End of Indicated Month.* (departure from average)

District	May	June	July	August	Sept.	"Approx. Days"
NW	48	3	-239	-389	-389	-19
NC	55	30	-171	-308	-292	-15
NE	74	46	-120	-249	-239	-12
WC	41	-7	-215	-360	-358	-18
C	54	25	-150	-291	-292	-15
EC	68	43	-103	-236	-240	-12
SW	36	-10	-167	-306	-305	-15
SC	31	-16	-162	-310	-329	-16
SE	54	34	-83	-212	-228	-11

*Adapted from Iowa Agricultural Statistics Reports.

Table 4. Growing Degree Units for Each Month.* (departure from average)

District	May	June	July	August	September
NW	48	-45	-242	-150	0
NC	55	-25	-201	-137	16
NE	74	-28	-166	-129	10
WC	41	-48	-208	-145	2
C	54	-29	-175	-141	-1
EC	68	-25	-146	-133	-4
SW	36	-46	-157	-139	1
SC	31	-47	-146	-148	-19
SE	54	-20	-117	-129	-19

*Adapted from Iowa Agricultural Statistics Reports.